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ABSTRACT

In 1997 the Board of Education of the Durham (North Carolina) Public Schools passed a policy that required all students performing below grade level on the Eighth Grade Competency Test in either reading or mathematics to attend summer school and demonstrate progress in order to be eligible for promotion to the next grade. This requirement was later extended to fifth grade students as well. Tests were constructed to measure student growth in mathematics during the summer school session. Differences between results on the test taken as a pretest and as a posttest were used as a measure of growth for each student. The average student gained between 3 points (grade 5) and 3.5 points (grade 8) in mathematics during the 15 days of instruction between the pretest and posttest. Over 76% of fifth graders had positive gain scores, and about 70% of eighth graders had positive scores. The proportion of students who demonstrated growth may be attributed, at least in part, to the provision of instructionally relevant diagnostic information to teachers at the beginning of the summer school session as well as to the seriousness with which students faced the summer school experience. Appendixes contain test item specifications and characteristics, a sample principal memo and report, and information on the frequency distribution of student gain scores. (Contains seven tables.) (SLD)

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Measuring Achievement Growth in an 18-Day Summer School Session

Joseph F. Haenn, Ph.D.

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Measuring Achievement Growth in an 18-Day Summer School Session

Joseph F. Haenn, Ph.D.

Durham (NC) Public Schools

Background

In 1995-96, North Carolina began an intensive accountability effort called the ***New ABCs of Public Education*** program for students in grades 3 through 8. This effort built on the state's End of Grade (EOG) testing program, which tests all students in these grades each year in reading and mathematics as well as in writing in grades 4 and 7. This testing program follows the guidelines of the North Carolina Standard Course of Study. The eighth grade EOG Test also serves as a Competency Test, with adequate performance on this test as a requirement for graduation.

Beginning with the 1997-98 school year, the ***ABCs*** program was extended to cover high schools. The high school program builds on the State's End of Course (EOC) testing program, with required testing in five subjects (algebra I, biology, ELPS, English I, and U.S. history) plus an English II writing exam, and optional testing in five other subjects (algebra II, geometry, physical science, chemistry, and physics).

Both the EOG and EOC testing programs classify students into four levels based on their performance on each of these tests:

Level I *Fails to achieve at a basic level*: Students performing at this level do not have sufficient mastery of knowledge and skills in this subject area to be successful at the next grade level.

Level II *Achieves at a basic level*: Students performing at this level demonstrate inconsistent mastery of the knowledge and skills that are fundamental in this subject area and that are minimally sufficient to be successful at the next grade level.

Level III *Achieves at a proficient level*: Students performing at this level consistently demonstrate mastery of grade level subject matter and skills and are well prepared for the next grade level.

Level IV *Achieves at an advanced level*: Students performing at this level consistently perform in a superior manner clearly beyond that required to be proficient at grade level work.

In 1997, the Board of Education of the Durham (NC) Public Schools passed a new policy on promotion from the eighth grade. This policy required that all students performing below grade level (i.e., Level I or II on the Eighth Grade Competency Test) in either reading or mathematics be required to attend summer school and demonstrate progress during summer school to be eligible for promotion to the next grade. In 1998, this policy was extended to cover fifth grade students as well. This new policy marked the end of social promotion in these grades, and preceded a new statewide social promotion policy passed recently by the State Board of Education.

Technique

The Office of Research, Development & Accountability was given the task to obtain measures of student growth during the summer school session. The North Carolina EOG Tests consist of three statistically equated forms for subject in each grade level. These forms in sum are intended to measure the scope of

the North Carolina Standard Course of Study for that subject and grade level. These forms are not of equal difficulty. In addition, they are secure documents and the State does not allow item analyses of their content. Due to these factors, individual student information about strengths and weaknesses below the curriculum goal level (e.g., at the objective or item level) are not possible. Therefore, the EOG Tests were not a potential source for measuring growth of students during summer school.

Summer school teachers most likely are not familiar with their summer school students and there are only 18 days available during summer school. To be maximally beneficial, the summer school teacher should have as much information about the student as possible early in the summer school session, rather than having to spend a week or more determining the functional level of each summer school student. Therefore, it would be useful to conduct a diagnostic evaluation of each student at the curriculum objective level as possible.[1]

Two testing administrations at the beginning of summer school in mathematics (i.e., one to obtain baseline information and one to obtain diagnostic information) plus a pretest in reading skills as well as posttests in both mathematics and reading would occupy parts of almost one-third of the days available for summer school. Again due to the limited time available during the summer school session, it was decided that a single test administration should be used to gather both diagnostic and pretest information in mathematics. Furthermore, this test administration should be limited to no more than 90 minutes, including instructions.

Test Design. Since these students are not performing on grade level, it was decided that the diagnostic information should be based on content one grade level below the current level of student functioning. Assessment using items at this level would better determine prerequisite skills that the students did not already possess. However, growth should be based on items from a student's current grade level placement, so that a better determination can be made as to whether a student should be promoted to the next grade following the conclusion of summer school.

Over the years, the North Carolina Department of Education has released a bank of over 5700 items in reading and mathematics for grades 3 through 8. These items were developed originally as part of the End of Grade Testing Program development process. However, these released items were either items that needed revision following field testing, were used in previous forms of the EOG Tests, or were just excess or redundant items. Items in this item bank have complete item characteristic data, including p values and point biserial correlations based on field testing.

Use of these items is enhanced through the use of the TestMagic© computer program. This commercially-available program incorporates all of the released items in the item bank and allows a user to easily construct camera-ready copies of tests using these items. The program also contains modules for on-line testing, scanning, scoring tests created by the program.[2]

Working with mathematics curriculum personnel in the central office, the most essential objectives were selected from the fourth and seventh grade levels (i.e., fourth grade items for fifth grade summer school students and seventh grade items for eighth grade summer school students). Since North Carolina's Standard Course of Study in mathematics is based on a spiral curriculum, this endeavor was most

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[1] The Communications Skills (reading) curriculum of the North Carolina Standard Course of Study is modeled after the New York State curriculum. As such, it only has four goal areas and eight objectives. This curriculum does not lend itself to obtaining diagnostic information, so this paper considers only the Mathematics curriculum.

[2] For information about TestMagic©, contact Clark Trivett at 3320 Seven Lakes West, West End, NC 27376; 910/673-2543.

appropriate and most meaningful for these low performing students. These below grade-level objectives formed the structure for the diagnostic portion of the pretest.

In addition, on-grade-level items were selected to obtain a pretest score. This survey portion of the test scanned the entire range of goals and objectives for each student's current grade level placement (i.e., grade 5 or 8).

The construction of each pretest, combining below grade-level diagnostic items and on grade-level survey items, is shown below.

Construction of Mathematics Pretests

	Diagnostic Portion		Survey Portion		
	Number of Objectives	Number of Items	Number of Objectives	Number of Items	Average *p* Value
Grade 5	20	60	31	40	0.48
Grade 8	25	75	26	40	0.48

Thus, each test used 40 items (the Survey Portion) as a pretest baseline score against which to measure growth. The fifth grade test also used 60 fourth grade items on which to provide diagnostic information about 20 objectives, while the eighth grade test used 75 seventh grade items on which to provide diagnostic information about 25 objectives. Survey and diagnostic items were interspersed throughout the test by objective.

To measure growth, a posttest was designed for each grade level. Each posttest consisted of 40 on grade-level items (the Survey Portion) that yielded a posttest score, as well a some below grade-level items (the Dummy Portion) to make the pretest and posttest forms more equivalent in length. The pretest and posttest survey items were matched on objectives and item characteristics so that each test covered roughly the same content and had equivalent average *p* values. The items from the Dummy Portion of the test were not scored. Survey and dummy items were interspersed throughout the test by objective.

The construction of these posttests, including on grade-level survey items and below grade-level dummy items, is shown below.

Construction of Mathematics Posttests

	Dummy Portion		Survey Portion		
	Number of Objectives	Number of Items	Number of Objectives	Number of Items	Average *p* Value
Grade 5	25	40	31	40	0.48
Grade 8	29	35	27	40	0.48

Copies of the item specifications and characteristics for each test are provided in Appendix A.

Providing Diagnostic Information. The Research, Development & Accountability (RD&A) staff were able to secure the summer school rosters in advance. Using these rosters, machine-scorable answer

documents were preslugged with student name and demographic information. The mathematics pretest was administered on the first day of summer school. Since machine-scorable answer documents were used, RD&A staff were able to score these tests overnight and provide to teachers a diagnostic profile for each individual student the following morning (i.e., the second day of summer school).

Measuring Growth. The difference between the average score on the 40 survey items on the pretest and on the posttest were used as a measure of growth for each student. Following the pretesting, a database was created and student information and pretest scores were entered. Since summer school was held in only 3 of the district's 26 elementary schools and only 3 of the district's 11 middle school, this database had to account for a student's summer school location as well as his or her home school assignment. Then, following the posttest, posttest scores were entered and gain scores computed for each student. There was a very short time frame following the conclusion of summer school (i.e., three days, including a weekend) for principals to make their promotion decisions. Therefore, it was essential that the database be as clean as possible before posttest data entry.

Middle and elementary school principals were provided with a home school individual student gain score report as well as a cover memorandum. [See a sample report and memo in Appendix B.] In addition to gain scores, principals were provided with a field test average score.[1] If a student was performing above this "state" average, they also could be considered for promotion.

Results

The raw scores expected to be obtained by an average student in the state of North Carolina on the 40 survey items on these summer school tests was as follows:

Expected Raw Scores Based on Item Statistics

Grade	Subject Matter	Pretest	Posttest
5	Mathematics	19.16	19.20
8	Mathematics	19.35	19.36

The following statistics represent the actual gain scores achieved by students during the 1998 summer school session:

Gain Score Statistics in Mathematics by Grade Level

				Gain Score at Percentile							Percent with Gain Score that was:		
Grade	Subject	Min.	Max.	25th	50th	75th	Ave.	Std.Dev.	Median	Mode	Neg.	Zero	Pos.
5	Math	-11	16	1.0	3.5	7.0	3.64	4.40	3.5	3	15.9	8.0	76.1
8	Math	-12	19	0.0	3.0	6.0	2.97	4.90	3.0	2	24.8	5.9	69.3

[1] No students ever took this particular combination of item during field testing of the items. However, since each item was field tested and had its own item statistics, a theoretical average test score could be computed for each pretest and posttest based on its 40 survey items.

As an example in how to interpret the above results, in fifth grade the minimum mathematics gain score was –11 (i.e., lost 11 raw score points), while the maximum gain score was +16 raw score points. The average raw score was 3.64 with a standard deviation of 4.4. A child in the 25th percentile for fifth grade summer school math students showed a gain of 1 raw score point, while a child at the 75th percentile showed a gain of 7 points. The middle (median) gain score was 3.5 raw score points, while the most frequent (modal) gain score was 3 points. The percent of fifth graders in summer school who showed a decline in mathematics between pretest and posttest was less than 16 percent, while over 3/4s showed a positive gain. Only 8 percent demonstrated no gain during summer school.

Conclusions

A frequency distribution of the gain scores is provided in Appendix C. The average student gained between 3 points (grade 5) and 3.5 points (grade 8) in mathematics during the 15 days of instruction between the pretest and the posttest.[4] Over 76 percent of the fifth graders had positive gain scores, while almost 70 percent of the eighth graders had positive gain scores. Students who did not demonstrate gains could be promoted only if they were scoring at or above the state average, or if there were mitigating circumstances. Each exception to the "demonstrating gain" rule had to be individually presented by the principal before the district Superintendent and the appropriate central office instructional leader (i.e., elementary or middle school assistant superintendent). As a result, students performing below grade level who did not attend summer school or did not demonstrate growth during summer school are no longer being socially promoted to the next grade level. The extremely large percentage of summer school attendees who demonstrated growth may be attributed, at least in part, to the provision of instructionally-relevant diagnostic information to teachers at the very beginning of the summer school session as well as the seriousness with which student now face the summer school experience..

Thus, under Board edict, Research, Development & Accountability staff were able to develop measurement instruments that served three masters. Summer school teachers were provided with instructionally-relevant individual student diagnostic information at the very beginning of summer school. Students were provided with scores that allowed them to demonstrate growth during the short summer school session. District-level decision makers were provided with evaluation information about the success of the summer school program. All of this was accomplished with a very minimum in terms of testing time, cost, personnel, and resources. This concept of developing a measurement instrument to serve multiple purposes with a minimum of effort can be applied in many other educational settings.

[4] The mathematics tests were administered on the first and next-to-last day of summer school. A reading survey test (to determine summer gain) was administered on the second and last day of summer school. Thus, the amount of instruction time and actual days was the same for both the mathematics and reading measures of student gain.

Appendix A

Test Item Specifications and Characteristics

Durham Public Schools Summer School

Grade 5 Mathematics Pretest

BANK ITEM NUMBER	CORRECT ANSWER	TEST ITEM NUMBER	OBJ'VE NUMBER	THINKING SKILL	ITEM TYPE	P VALUE	POINT BISERIAL
104507	D	1	1.5	Evaluating	MC	0.74	0.224
104494	C	2	1.5	Evaluating	MC	0.46	0.293
104504	D	3	1.5	Applying	MC	0.33	0.454
50844	A	4	1.02	Analyzing	MC	0.93	0.190
50795	D	5	1.02	Knowledge	MC	0.31	0.538
104520	A	6	1.6	Analyzing	MC	0.70	0.310
104522	C	7	1.6	Analyzing	MC	0.49	0.354
104508	A	8	1.6	Knowledge	MC	0.34	0.363
102545	A	9	1.03	Knowledge	MC	0.87	0.352
101692	C	10	1.05	Knowledge	MC	0.23	0.356
104564	B	11	1.9	Evaluating	MC	0.71	0.412
104572	B	12	1.9	Applying	MC	0.52	0.323
103918	D	13	1.9	Organizing	MC	0.29	0.296
50245	A	14	1.06	Analyzing	MC	0.20	0.288
102558	A	15	1.07	Applying	MC	0.72	0.252
103148	C	16	2.1	Knowledge	MC	0.72	0.372
104107	A	17	2.1	Knowledge	MC	0.50	0.251
104592	C	18	2.1	Applying	MC	0.28	0.309
102564	C	19	1.09	Applying	MC	0.33	0.219
102571	C	20	2.01	Applying	MC	0.71	0.389
10460^	A	21	2.2	Applying	MC	0.73	0.350
104608	A	22	2.2	Analyzing	MC	0.50	0.393
103153	D	23	2.2	Evaluating	MC	0.32	0.311
51266	C	24	2.01	Analyzing	MC	0.21	0.180
102573	A	25	2.02	Organizing	MC	0.44	0.277
104187	B	26	3.3	Generating	MC	0.73	0.448
40241	C	27	3.3	Analyzing	MC	0.49	0.369
104193	C	28	3.3	Applying	MC	0.30	0.317
102592	A	29	2.08	Analyzing	MC	0.50	0.438
102598	D	30	2.10	Integratin	MC	0.20	0.362
104773	A	31	3.5	Integratin	MC	0.71	0.374
104768	D	32	3.5	Applying	MC	0.52	0.467
104216	B	33	3.5	Analyzing	MC	0.28	0.130
102601	B	34	3.10	Evaluating	MC	0.86	0.108
102138	D	35	3.20	Analyzing	MC	0.36	0.495
104789	D	36	3.6	Generating	MC	0.74	0.488
104217	D	37	3.6	Generating	MC	0.50	0.431
104793	C	38	3.6	Evaluating	MC	0.29	0.287
50257	A	39	3.30	Generating	MC	0.62	0.273
50299	D	40	3.50	Analyzing	MC	0.42	0.330
103920	D	41	4.01	Applying	MC	0.65	0.393
103923	B	42	4.01	Applying	MC	0.47	0.412
104825	B	43	4.01	Applying	MC	0.20	0.363
102149	B	44	4.20	Applying	MC	0.23	0.154
50334	B	45	4.20	Analyzing	MC	0.19	0.277
104005	C	46	4.09	Applying	MC	0.68	0.233
40397	B	47	4.09	Applying	MC	0.50	0.422
104975	C	48	4.09	Applying	MC	0.30	0.423
102154	A	49	4.50	Knowledge	MC	0.45	0.302
102629	B	50	4.50	Knowledge	MC	0.31	0.235
104237	D	51	5.1	Knowledge	MC	0.71	0.415
105027	B	52	5.1	Integratin	MC	0.52	0.373
105020	C	53	5.1	Applying	MC	0.30	0.385
50773	D	54	4.60	Applying	MC	0.51	0.490
50952	D	55	4.60	Applying	MC	0.53	0.271
104275	C	56	5.4	Knowledge	MC	0.68	0.510

Durham Public Schools Summer School

Grade 5 Mathematics Pretest

BANK ITEM NUMBER	CORRECT ANSWER	TEST ITEM NUMBER	OBJ'VE NUMBER	THINKING SKILL	ITEM TYPE	P VALUE	POINT BISERIAL
104268	C	57	5.4	Analyzing	MC	0.51	0.373
105082	D	58	5.4	Applying	MC	0.27	0.314
102158	C	59	5.10	Applying	MC	0.35	0.347
102643	D	60	5.30	Integratin	MC	0.78	0.382
105353	D	61	6.1	Knowledge	MC	0.70	0.413
105359	A	62	6.1	Integratin	MC	0.52	0.415
105358	D	63	6.1	Applying	MC	0.31	0.450
50526	B	64	6.40	Applying	MC	0.38	0.157
101697	C	65	6.40	Knowledge	MC	0.30	0.276
105406	C	66	6.4	Knowledge	MC	0.72	0.500
105411	B	67	6.4	Applying	MC	0.50	0.465
105407	B	68	6.4	Knowledge	MC	0.29	0.358
102672	D	69	6.60	Evaluating	MC	0.31	0.421
50850	B	70	6.70	Analyzing	MC	0.89	0.293
40598	B	71	6.5	Knowledge	MC	0.63	0.352
104080	C	72	6.5	Organizing	MC	0.50	0.382
105423	B	73	6.5	Evaluating	MC	0.33	0.418
100859	D	74	6.70	Applying	MC	0.68	0.358
50570	B	75	6.80	Analyzing	MC	0.53	0.344
40814	A	76	7.01	Organizing	MC	0.69	0.514
100105	B	77	7.01	Applying	MC	0.48	0.568
105177	C	78	7.01	Integratin	MC	0.28	0.287
102679	D	79	6.80	Generating	MC	0.44	0.392
50593	D	80	6.90	Generating	MC	0.27	0.398
104341	A	81	7.03	Applying	MC	0.73	0.270
104342	D	82	7.03	Applying	MC	0.52	0.492
104345	D	83	7.03	Applying	MC	0.29	0.498
102689	D	84	7.03	Organizing	MC	0.48	0.405
50824	D	85	7.05	Analyzing	MC	0.67	0.424
104348	B	86	7.04	Applying	MC	0.70	0.408
104356	C	87	7.04	Applying	MC	0.51	0.354
105227	C	88	7.04	Analyzing	MC	0.38	0.359
102709	C	89	7.09	Evaluating	MC	0.42	0.499
102713	A	90	7.10	Generating	MC	0.42	0.395
105245	B	91	7.05	Applying	MC	0.72	0.548
105249	B	92	7.05	Generating	MC	0.50	0.468
105250	C	93	7.05	Applying	MC	0.30	0.464
50713	A	94	7.11	Knowledge	MC	0.50	0.359
50768	B	95	7.13	Applying	MC	0.54	0.466
100106	D	96	7.08	Knowledge	MC	0.68	0.408
105300	A	97	7.08	Integratin	MC	0.35	0.328
105292	C	98	7.08	Knowledge	MC	0.50	0.531
50732	D	99	7.13	Applying	MC	0.63	0.352
50453	B	100	7.14	Applying	MC	0.44	0.362
					AVERAGES(ZEROS NOT INCLUDED)	0.49	0.366

RANGE (ZEROS NOT INCLUDED) OF P-VALUES 0.19 - 0.93

RANGE (ZEROS NOT INCLUDED) OF POINT BISERIALS 0.108 - 0.568

Average field test raw score for this test is 49.27 or 49.3 %,

based on 100 non-zero p values.

1998 Durham Public School Summer School

Fifth Grade Mathematics Posttest

BANK ITEM NUMBER	CORRECT ANSWER	TEST ITEM NUMBER	OBJ'VE NUMBER	THINKING SKILL	ITEM TYPE	P VALUE	POINT BISERIAL
50087	C	1	1.02	Knowledge	MC	0.91	0.301
101704	A	2	1.01	Organizing	MC	0.90	0.299
50014	D	3	1.02	Applying	MC	0.38	0.131
50089	A	4	1.02	Knowledge	MC	0.62	0.409
50025	A	5	1.03	Knowledge	MC	0.77	0.138
101691	D	6	1.04	Knowledge	MC	0.58	0.283
102553	A	7	1.05	Evaluating	MC	0.26	0.143
102116	C	8	1.06	Organizing	MC	0.51	0.404
50242	B	9	1.06	Applying	MC	0.21	0.286
50808	B	10	1.07	Analyzing	MC	0.94	0.141
102559	C	11	1.07	Integratin	MC	0.80	0.319
102121	A	12	1.08	Knowledge	MC	0.52	0.219
102565	D	13	1.09	Organizing	MC	0.28	0.161
102596	D	14	2.10	Integratin	MC	0.80	0.312
102570	B	15	2.01	Knowledge	MC	0.52	0.328
50229	A	16	3.10	Analyzing	MC	0.64	0.463
102569	C	17	2.01	Knowledge	MC	0.36	0.342
102614	A	18	3.60	Integratin	MC	0.32	0.195
102574	A	19	2.02	Integratin	MC	0.58	0.413
102425	A	20	4.30	Analyzing	MC	0.78	0.277
102591	D	21	2.08	Generating	MC	0.33	0.355
102624	C	22	4.30	Integratin	MC	0.34	0.491
102597	D	23	2.10	Integratin	MC	0.28	0.338
50397	D	24	4.60	Analyzing	MC	0.33	-0.007
102429	A	25	3.10	Analyzing	MC	0.79	0.430
102208	C	26	4.50	Knowledge	MC	0.60	0.313
102603	C	27	3.20	Analyzing	MC	0.57	0.406
100079	D	28	4.60	Applying	MC	0.34	0.387
102605	B	29	3.30	Knowledge	MC	0.39	0.031
102210	C	30	4.60	Applying	MC	0.46	0.182
102612	C	31	3.50	Applying	MC	0.43	0.343
50772	D	32	4.60	Applying	MC	0.79	0.331
102622	B	33	4.20	Analyzing	MC	0.27	0.238
50774	D	34	4.60	Applying	MC	0.66	0.391
102621	B	35	4.20	Evaluating	MC	0.28	0.320
50791	C	36	4.60	Applying	MC	0.55	0.324
102631	D	37	4.50	Organizing	MC	0.45	0.143
50818	C	38	4.60	Applying	MC	0.74	0.396
50385	A	39	4.50	Applying	MC	0.29	0.237
102632	B	40	4.60	Knowledge	MC	0.68	0.380
50792	A	41	4.60	Applying	MC	0.52	0.366
102652	A	42	5.60	Evaluating	MC	0.90	0.354
51037	B	43	4.60	Applying	MC	0.51	0.477
102420	B	44	5.70	Generating	MC	0.85	0.396
102159	D	45	5.10	Applying	MC	0.41	0.088
102665	C	46	6.40	Applying	MC	0.54	0.398
102642	C	47	5.30	Applying	MC	0.41	0.347
50957	A	48	6.40	Applying	MC	0.64	0.115
50525	C	49	6.40	Applying	MC	0.51	0.367
50851	A	50	6.70	Analyzing	MC	0.69	0.400
50268	C	51	6.40	Integratin	MC	0.40	0.293
102167	C	52	6.80	Organizing	MC	0.59	0.403
102673	D	53	6.60	Organizing	MC	0.54	0.392
102685	C	54	7.01	Generating	MC	0.41	0.319
5R3	B	55	6.70	Generating	MC	0.76	0.486
102696	B	56	7.05	Analyzing	MC	0.55	0.344

1998 Durham Public School Summer School — Fifth Grade Mathematics Posttest

BANK ITEM NUMBER	CORRECT ANSWER	TEST ITEM NUMBER	OBJ'VE NUMBER	THINKING SKILL	ITEM TYPE	P VALUE	POINT BISERIAL
50563	C	57	6.70	Generating	MC	0.73	0.274
102701	B	58	7.06	Generating	MC	0.62	0.457
101711	C	59	6.80	Applying	MC	0.54	0.313
102704	A	60	7.07	Analyzing	MC	0.52	0.471
50409	A	61	6.80	Applying	MC	0.45	0.447
50730	B	62	7.13	Applying	MC	0.54	0.514
102681	C	63	6.90	Evaluating	MC	0.29	0.107
50827	B	64	7.13	Applying	MC	0.43	0.190
102692	B	65	7.03	Analyzing	MC	0.43	0.510
102176	A	66	7.14	Applying	MC	0.62	0.458
102697	D	67	7.05	Applying	MC	0.67	0.314
102430	D	68	7.14	Applying	MC	0.73	0.402
102710	A	69	7.09	Applying	MC	0.46	0.393
102725	B	70	7.14	Evaluating	MC	0.40	0.090
101725	B	71	7.10	Knowledge	MC	0.56	0.230
102723	A	72	7.14	Organizing	MC	0.61	0.308
102715	A	73	7.11	Evaluating	MC	0.41	0.310
102541	C	74	1.01	Organizing	MC	0.36	0.290
50731	C	75	7.13	Applying	MC	0.52	0.376
102550	B	76	1.04	Generating	MC	0.26	0.219
50728	B	77	7.13	Applying	MC	0.60	0.439
102555	A	78	1.06	Analyzing	MC	0.36	0.455
51263	A	79	7.14	Applying	MC	0.44	0.450
102546	B	80	1.03	Generating	MC	0.41	0.387

AVERAGES(ZEROS NOT INCLUDED) 0.51 0.329

RANGE (ZEROS NOT INCLUDED) OF P-VALUES 0.21 0.94

RANGE (ZEROS NOT INCLUDED) OF POINT BISERIALS -0.097 0.576

Average field test raw score for this test is 42.28 or 52.9 %.

based on 80 non-zero p values.

Durham Public Schools Summer School

Grade 8 Mathematics Pretest

BANK ITEM NUMBER	CORRECT ANSWER	TEST ITEM NUMBER	OBJ'VE NUMBER	THINKING SKILL	ITEM TYPE	P VALUE	POINT BISERIAL
102295	B	1	1.2	Analyzing	MC	0.76	0.402
102294	C	2	1.2	Analyzing	MC	0.66	0.526
102234	B	3	1.2	Generating	MC	0.49	0.424
103489	D	4	1.2	Knowledge	MC	0.53	0.623
103492	A	5	1.3	Knowledge	MC	0.66	0.434
103743	B	6	1.4	Organizing	MC	0.59	0.202
100586	D	7	1.3	Knowledge	MC	0.58	0.394
103655	C	8	1.3	Applying	MC	0.47	0.399
102248	A	9	1.7	Organizing	MC	0.21	0.335
103494	D	10	1.4	Knowledge	MC	0.57	0.488
103493	C	11	1.4	Knowledge	MC	0.46	0.457
102261	A	12	2.4	Knowledge	MC	0.40	0.313
102301	D	13	1.4	Applying	MC	0.27	0.463
103497	D	14	1.6	Knowledge	MC	0.59	0.329
102266	B	15	2.6	Analyzing	MC	0.37	0.300
102305	C	16	1.6	Evaluating	MC	0.26	0.485
102306	D	17	1.6	Generating	MC	0.18	0.461
103762	C	18	2.6	Organizing	MC	0.49	0.326
100331	D	19	2.2	Analyzing	MC	0.56	0.332
102313	A	20	2.2	Applying	MC	0.43	0.299
102268	C	21	2.7	Applying	MC	0.31	0.356
102315	C	22	2.2	Applying	MC	0.36	0.286
102318	B	23	2.3	Evaluating	MC	0.43	0.286
102272	D	24	3.1	Analyzing	MC	0.77	0.354
102316	D	25	2.3	Evaluating	MC	0.23	0.148
102317	A	26	2.3	Applying	MC	0.17	0.135
103767	A	27	3.2	Knowledge	MC	0.35	0.476
102325	C	28	2.6	Knowledge	MC	0.83	0.261
102327	D	29	2.6	Applying	MC	0.58	0.357
102276	C	30	3.3	Applying	MC	0.34	0.430
103511	B	31	2.6	Analyzing	MC	0.38	0.419
100469	D	32	3.1	Analyzing	MC	0.59	0.539
103769	B	33	3.3	Integratin	MC	0.54	0.330
102822	C	34	3.1	Generating	MC	0.58	0.561
102331	B	35	3.1	Integratin	MC	0.41	0.499
102281	B	36	3.4	Analyzing	MC	0.39	0.269
103526	D	37	4.1	Analyzing	MC	0.65	0.329
102347	A	38	4.1	Applying	MC	0.50	0.431
102894	C	39	3.4	Applying	MC	0.47	0.490
102348	D	40	4.1	Applying	MC	0.15	0.305
102352	D	41	4.3	Generating	MC	0.82	0.372
102896	B	42	3.4	Generating	MC	0.68	0.478
103529	D	43	4.3	Knowledge	MC	0.47	0.205
103530	A	44	4.3	Knowledge	MC	0.63	0.221
102900	A	45	3.5	Evaluating	MC	0.33	0.386
103537	C	46	5.1	Analyzing	MC	0.65	0.481
102363	B	47	5.1	Analyzing	MC	0.58	0.404
80289	A	48	3.5	Generating	MC	0.50	0.383
102843	C	49	5.1	Integratin	MC	0.57	0.484
102859	B	50	5.5	Analyzing	MC	0.77	0.397
102286	A	51	3.6	Analyzing	MC	0.81	0.399
102861	B	52	5.5	Analyzing	MC	0.72	0.370
7R1	D	53	5.5	Evaluating	MC	0.53	0.469
102287	D	54	3.6	Analyzing	MC	0.21	0.235
102379	C	55	6.1	Analyzing	MC	0.79	0.397
102380	A	56	6.1	Evaluating	MC	0.65	0.322

BANK ITEM NUMBER	CORRECT ANSWER	TEST ITEM NUMBER	OBJ'VE NUMBER	THINKING SKILL	ITEM TYPE	P VALUE	POINT BISERIAL
102905	D	57	3.6	Analyzing	MC	0.51	0.480
103547	A	58	6.1	Analyzing	MC	0.58	0.248
103551	C	59	6.3	Applying	MC	0.69	0.263
80265	B	60	3.7	Applying	MC	0.70	0.436
103552	A	61	6.3	Applying	MC	0.26	0.211
102384	A	62	6.3	Evaluating	MC	0.28	0.167
103829	D	63	3.7	Applying	MC	0.29	0.387
102395	C	64	6.6	Applying	MC	0.48	0.462
103557	C	65	6.6	Analyzing	MC	0.41	0.534
80373	A	66	4.2	Knowledge	MC	0.48	0.239
70607	D	67	6.6	Applying	MC	0.27	0.483
102400	C	68	6.8	Applying	MC	0.46	0.480
103784	A	69	4.3	Organizing	MC	0.56	0.278
70805	A	70	6.8	Analyzing	MC	0.43	0.477
103562	B	71	6.8	Analyzing	MC	0.35	0.484
102910	C	72	5.1	Analyzing	MC	0.48	0.390
102863	B	73	7.1	Organizing	MC	0.46	0.451
102406	D	74	7.1	Applying	MC	0.44	0.483
103697	B	75	5.2	Knowledge	MC	0.79	0.358
102405	B	76	7.1	Applying	MC	0.39	0.497
102868	C	77	7.2	Generating	MC	0.54	0.440
103791	C	78	5.2	Organizing	MC	0.33	0.227
102866	B	79	7.2	Evaluating	MC	0.36	0.401
70675	C	80	7.2	Applying	MC	0.32	0.450
103793	C	81	5.3	Analyzing	MC	0.82	0.335
102874	D	82	7.4	Applying	MC	0.76	0.474
102413	B	83	7.4	Applying	MC	0.60	0.504
102919	C	84	5.3	Evaluating	MC	0.31	0.302
102415	C	85	7.4	Applying	MC	0.58	0.449
103573	B	86	7.5	Applying	MC	0.67	0.464
102922	D	87	5.4	Evaluating	MC	0.37	0.373
70860	B	88	7.5	Applying	MC	0.58	0.473
102880	A	89	7.5	Organizing	MC	0.56	0.484
102924	D	90	5.4	Integratin	MC	0.59	0.468
102312	A	91	2.1	Analyzing	MC	0.44	0.124
102310	D	92	2.1	Knowledge	MC	0.40	0.231
102927	A	93	5.5	Analyzing	MC	0.68	0.537
103502	A	94	2.1	Knowledge	MC	0.38	0.305
70312	D	95	3.3	Knowledge	MC	0.62	0.514
102926	A	96	5.5	Evaluating	MC	0.50	0.435
102833	B	97	3.3	Generating	MC	0.62	0.452
102830	A	98	3.3	Knowledge	MC	0.34	0.000
103710	D	99	5.6	Generating	MC	0.33	0.264
102356	C	100	4.4	Analyzing	MC	0.58	0.292
102355	A	101	4.4	Applying	MC	0.55	0.204
102931	B	102	5.6	Integratin	MC	0.31	0.259
103532	D	103	4.4	Applying	MC	0.13	0.444
103533	A	104	4.5	Applying	MC	0.40	0.348
103801	C	105	6.1	Analyzing	MC	0.39	0.355
103534	B	106	4.5	Applying	MC	0.29	0.228
102358	B	107	4.5	Analyzing	MC	0.22	0.184
103721	D	108	6.4	Applying	MC	0.26	0.300
100392	C	109	6.2	Applying	MC	0.58	0.429
102383	B	110	6.2	Integratin	MC	0.56	0.317
103723	A	111	6.5	Evaluating	MC	0.63	0.446
102381	B	112	6.2	Applying	MC	0.44	0.226

BANK ITEM NUMBER	CORRECT ANSWER	TEST ITEM NUMBER	OBJ'VE NUMBER	THINKING SKILL	ITEM TYPE	P VALUE	POINT BISERIAL
103809	D	113	6.5	Integratin	MC	0.61	0.442
80936	B	114	7.1	Applying	MC	0.75	0.399
103816	D	115	7.2	Organizing	MC	0.41	0.401
				AVERAGES(ZEROS NOT INCLUDED)		0.49	0.374

RANGE (ZEROS NOT INCLUDED) OF P-VALUES 0.13 - 0.83

RANGE (ZEROS NOT INCLUDED) OF POINT BISERIALS 0.124 - 0.623

Average field test raw score for this test is 56.39 or 49.0 %,

based on 115 non-zero p values.

Durham Public Schools Summer School

Grade 8 Mathematics Posttest

BANK ITEM NUMBER	CORRECT ANSWER	TEST ITEM NUMBER	OBJ'VE NUMBER	THINKING SKILL	ITEM TYPE	P VALUE	POINT BISERIAL
103738	C	1	1.2	Generating	MC	0.76	0.340
102292	B	2	1.1	Applying	MC	0.57	0.403
81109	B	3	1.4	Applying	MC	0.39	0.248
103490	B	4	1.2	Analyzing	MC	0.51	0.480
103748	A	5	1.7	Organizing	MC	0.21	0.308
100587	C	6	1.3	Knowledge	MC	0.78	0.383
103756	D	7	2.4	Organizing	MC	0.18	0.322
100327	D	8	1.4	Knowledge	MC	0.52	0.400
102265	C	9	2.6	Generating	MC	0.51	0.308
102303	C	10	1.5	Evaluating	MC	0.70	0.448
103761	D	11	2.6	Organizing	MC	0.53	0.324
100524	B	12	1.6	Organizing	MC	0.51	0.381
102270	A	13	2.7	Applying	MC	0.28	0.342
70105	A	14	1.7	Analyzing	MC	0.61	0.349
102273	D	15	3.1	Analyzing	MC	0.70	0.497
103507	B	16	2.4	Analyzing	MC	0.52	0.347
101431	C	17	3.2	Knowledge	MC	0.49	0.302
103509	D	18	2.5	Analyzing	MC	0.55	0.406
80251	C	19	3.3	Analyzing	MC	0.46	0.296
103514	A	20	2.7	Generating	MC	0.66	0.273
103770	C	21	3.3	Integratin	MC	0.34	0.234
7R3	B	22	3.1	Analyzing	MC	0.59	0.408
101567	B	23	3.4	Applying	MC	0.30	0.513
103518	A	24	3.2	Analyzing	MC	0.70	0.208
80274	C	25	3.4	Applying	MC	0.38	0.378
102337	A	26	3.3	Applying	MC	0.67	0.449
102897	C	27	3.4	Generating	MC	0.68	0.411
70275	C	28	3.4	Applying	MC	0.67	0.424
102901	A	29	3.5	Analyzing	MC	0.54	0.409
103523	C	30	3.5	Organizing	MC	0.64	0.404
103774	C	31	3.5	Analyzing	MC	0.31	0.262
102351	D	32	4.2	Evaluating	MC	0.64	0.410
102285	C	33	3.6	Analyzing	MC	0.61	0.410
102361	C	34	4.6	Applying	MC	0.57	0.292
103776	A	35	3.6	Analyzing	MC	0.43	0.439
103538	D	36	5.1	Analyzing	MC	0.70	0.341
101504	A	37	3.6	Knowledge	MC	0.43	0.370
102366	B	38	5.2	Applying	MC	0.61	0.444
102290	D	39	3.7	Applying	MC	0.39	0.331
102372	D	40	5.4	Evaluating	MC	0.57	0.381
101570	B	41	3.7	Knowledge	MC	0.38	0.409
103546	B	42	5.5	Analyzing	MC	0.68	0.089
80379	C	43	4.2	Knowledge	MC	0.37	0.310
102388	C	44	6.4	Analyzing	MC	0.71	0.433
103684	C	45	4.3	Organizing	MC	0.70	0.489
102394	C	46	6.6	Analyzing	MC	0.62	0.302
102912	C	47	5.1	Integratin	MC	0.45	0.267
103559	C	48	6.7	Analyzing	MC	0.68	0.409
102913	B	49	5.2	Knowledge	MC	0.49	0.421
102404	C	50	7.1	Applying	MC	0.63	0.558
103792	B	51	5.2	Organizing	MC	0.79	0.259
70703	D	52	7.3	Applying	MC	0.58	0.431
103700	A	53	5.3	Evaluating	MC	0.72	0.498
102414	D	54	7.4	Analyzing	MC	0.56	0.384
102918	A	55	5.3	Knowledge	MC	0.54	0.340
102879	B	56	7.5	Organizing	MC	0.63	0.426

BANK ITEM NUMBER	CORRECT ANSWER	TEST ITEM NUMBER	OBJ'VE NUMBER	THINKING SKILL	ITEM TYPE	P VALUE	POINT BISERIAL
103796	D	57	5.4	Evaluating	MC	0.41	0.411
103571	D	58	7.4	Knowledge	MC	0.67	0.430
102923	C	59	5.4	Integratin	MC	0.38	0.386
102410	B	60	7.3	Applying	MC	0.55	0.437
102928	A	61	5.5	Analyzing	MC	0.39	0.369
102411	A	62	7.3	Applying	MC	0.55	0.509
102925	B	63	5.5	Generating	MC	0.83	0.413
102862	C	64	7.1	Applying	MC	0.74	0.421
103709	B	65	5.6	Analyzing	MC	0.50	0.394
102398	A	66	6.8	Applying	MC	0.47	0.458
102931	B	67	5.6	Integratin	MC	0.31	0.259
102397	A	68	6.7	Generating	MC	0.53	0.254
103712	D	69	6.1	Organizing	MC	0.39	0.266
103554	C	70	6.4	Analyzing	MC	0.73	0.317
103807	C	71	6.4	Generating	MC	0.27	0.307
103724	B	72	6.5	Evaluating	MC	0.61	0.414
103726	B	73	6.5	Evaluating	MC	0.60	0.460
80933	B	74	7.1	Applying	MC	0.87	0.415
103815	B	75	7.2	Organizing	MC	0.34	0.260
				AVERAGES(ZEROS NOT INCLUDED)		0.55	0.372

RANGE (ZEROS NOT INCLUDED) OF P-VALUES 0.18 - 0.87

RANGE (ZEROS NOT INCLUDED) OF POINT BISERIALS 0.089 - 0.558

Average field test raw score for this test is 40.88 or 54.5 %,

based on 75 non-zero p values.

Appendix B

Sample Principal Memo and Report

DURHAM PUBLIC SCHOOLS

TO: Middle School Principals

FROM: Joseph F. Haenn
Coordinator of Program Evaluation

DATE: July 17, 1998

SUBJECT: **1998 SUMMER SCHOOL GAIN SCORES**

Enclosed please find the 1998 Summer School testing results for students from your base school. There are two lists: one for mathematics and one for reading. Each set of results consists of the following information:

LP	An "X" indicates that this student is a Local Promotion summer school student. In other words, this student scored at or above grade level (Level III or IV) on both the reading and math sections of the End of Grade or Competency Test, but failed one or more subjects. Although provided with summer school services, the services provided to these students (i.e., reading and/or math) were determined by each summer school site.
Name	Student name (last name first)
SSN	Student Social Security Number (or alternative, where a blank exists for any letters)
Teacher	Student's summer school teacher for this subject area
SSSite	School number of this student's summer school site
SendSch	Student's base school (i.e., your school number)
PreCorr	Number of items correct on pretest
PreTried	Number of items attempted on pretest
PrePct	Percent of pretest items tried that were correct
PostCorr	Number of items correct on posttest
PostTried	Number of items attempted on posttest
PostPct	Percent of posttest items tried that were correct
Gain	Difference between posttest and pretest raw score (NOTE: a positive score indicates that the student demonstrated progress in this subject matter during the summer school term
Notes	Indicates where students missed a pretest (or its makeup) or posttest (for which there was no makeup testing)

511 Cleveland Street ■ P.O. Box 30002, Durham, North Carolina 27702 ■ (919) 560-2421, FAX (919) 560-2067

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If you cannot find a student on this listing who was scheduled to attend Summer School, that probably means that the student was either a "No Show" at Summer School, withdrew from Summer School before posttest rosters were submitted, was suspended from Summer School, or was dropped from Summer School due to too many absences. Under each of these situations, the student is eligible to repeat the same grade.

As a reference guide to your interpretation of the scores of these students, the average student in North Carolina would have received the following scores on this test had they taken it near the end of the fifth grade:

	Pretest	Posttest
Mathematics	19.35	19.36
Reading	20.42	20.44

If you need further information, please feel free to contact me at 560-2421.

511 Cleveland Street ■ P.O. Box 30002, Durham, North Carolina 27702 ■ (919) 560-2421, FAX (919) 560-2067

1998 Summer School Gain Scores in Mathematics

LP	Name	SSN	Teacher	SSSite	SendSch	PreCorr	PreTried	PrePct	PostCorr	PostTried	PostPct	Gain	Notes
	[redacted]	[redacted]	Maureen Garrett	360	304	11	40	28	17	40	43	6	
		[redacted]	Bridgette Woods	320	304	13	40	32	18	40	45	5	
		[redacted]	James Zanfini	360	304	11	40	28	18	40	45	7	
		[redacted]	Nathalie Smith	360	304	18	40	45	19	40	48	1	
		[redacted]	Kathryn Kiehle	360	304	12	40	30	9	40	23	-3	
		[redacted]	Kathryn Kiehle	360	304	18	40	45	26	40	65	8	
		[redacted]	Jayven Brown	360	304	8	40	20	16	40	40	8	
		[redacted]	Kathryn Kiehle	360	304	16	40	40	16	40	40	0	
		[redacted]	L. Christensen	360	304	18	40	45	22	40	55	4	
		[redacted]	James Zanfini	360	304	12	40	30	12	40	30	0	
		[redacted]	Nathalie Smith	360	304	13	40	32	13	38	34	0	
		[redacted]	Jayven Brown	360	304	11	40	28	16	40	40	5	
		[redacted]	L. Christensen	360	304	13	40	32	21	40	53	8	
		[redacted]	James Zanfini	360	304	18	40	45	18	40	45	0	
		[redacted]	Kathryn Kiehle	360	304	17	40	42	25	40	63	8	
		[redacted]	L. Christensen	360	304	11	40	28	18	40	45	7	
		[redacted]	Nathalie Smith	360	304	15	39	38	23	40	58	8	
		[redacted]	Nathalie Smith	360	304	17	40	42	18	40	45	1	
		[redacted]	James Zanfini	360	304	13	39	32	22	38	58	9	
		[redacted]	Kathryn Kiehle	360	304	21	40	52	23	40	58	2	
		[redacted]	Kathryn Kiehle	360	304	10	40	25	15	40	38	5	
		[redacted]	James Zanfini	360	304	17	40	42	21	40	53	4	
		[redacted]	Nathalie Smith	360	304	13	40	32	23	40	58	10	
		[redacted]	Sarah Brown	372	304	15	40	38	20	40	50	5	
		[redacted]	Jayven Brown	360	304	14	40	35	15	40	38	1	
		[redacted]	Kathryn Kiehle	360	304	22	40	55	29	40	73	7	

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Appendix C

Frequency Distribution of Student Gain Scores

Frequencies for Fifth Grade Math Summer School Gain Scores

Statistics

GAIN

N	Valid	490
	Missing	12
Mean		3.64
Median		3.50
Mode		3
Std. Deviation		4.40
Minimum		-11
Maximum		16
Percentiles	25	1.00
	50	3.50
	75	7.00

GAIN

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	-11	1	.2	.2	.2
	-9	1	.2	.2	.4
	-7	3	.6	.6	1.0
	-6	6	1.2	1.2	2.2
	-5	4	.8	.8	3.1
	-4	11	2.2	2.2	5.3
	-3	16	3.2	3.3	8.6
	-2	16	3.2	3.3	11.8
	-1	20	4.0	4.1	15.9
	0	39	7.8	8.0	23.9
	1	35	7.0	7.1	31.0
	2	42	8.4	8.6	39.6
	3	51	10.2	10.4	50.0
	4	41	8.2	8.4	58.4
	5	41	8.2	8.4	66.7
	6	36	7.2	7.3	74.1
	7	23	4.6	4.7	78.8
	8	32	6.4	6.5	85.3
	9	28	5.6	5.7	91.0
	10	16	3.2	3.3	94.3
	11	13	2.6	2.7	96.9
	12	7	1.4	1.4	98.4
	13	4	.8	.8	99.2
	14	1	.2	.2	99.4
	16	3	.6	.6	100.0
	Total	490	97.6	100.0	
Missing	System	12	2.4		
Total		502	100.0		

Frequencies for Eighth Grade Math Summer School Gain Scores

Statistics

GAIN

N	Valid	488
	Missing	29
Mean		2.97
Median		3.00
Mode		2
Std. Deviation		4.90
Minimum		-12
Maximum		19
Percentiles	25	.00
	50	3.00
	75	6.00

GAIN

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	-12	1	.2	.2	.2
	-11	2	.4	.4	.6
	-10	1	.2	.2	.8
	-9	1	.2	.2	1.0
	-8	1	.2	.2	1.2
	-7	4	.8	.8	2.0
	-6	9	1.7	1.8	3.9
	-5	13	2.5	2.7	6.6
	-4	11	2.1	2.3	8.8
	-3	24	4.6	4.9	13.7
	-2	21	4.1	4.3	18.0
	-1	33	6.4	6.8	24.8
	0	29	5.6	5.9	30.7
	1	33	6.4	6.8	37.5
	2	45	8.7	9.2	46.7
	3	35	6.8	7.2	53.9
	4	40	7.7	8.2	62.1
	5	33	6.4	6.8	68.9
	6	36	7.0	7.4	76.2
	7	32	6.2	6.6	82.8
	8	22	4.3	4.5	87.3
	9	18	3.5	3.7	91.0
	10	18	3.5	3.7	94.7
	11	7	1.4	1.4	96.1
	12	9	1.7	1.8	98.0
	13	1	.2	.2	98.2
	14	3	.6	.6	98.8
	15	3	.6	.6	99.4
	16	1	.2	.2	99.6
	18	1	.2	.2	99.8
	19	1	.2	.2	100.0
	Total	488	94.4	100.0	
Missing	System	29	5.6		
Total		517	100.0		